defining n and ρ, the equation reads:

$$\frac{d^2R}{d\rho^2} + \frac{2}{\rho}\frac{dR}{d\rho} - \left\{\frac{1}{4} - \frac{n}{\rho} + \frac{l(l+1)}{\rho^2}\right\} R = 0. \tag{3}$$

Substituting

$$R = e^{-\frac{1}{2}\rho} \rho^l F(\rho), \tag{4}$$

we get the equation:

$$\rho \frac{d^2F}{d\rho^2} + (2l + 2 - \rho)\frac{dF}{d\rho} + (n - 1 - l) F = 0 \tag{5}$$

for the confluent hypergeometic function *)

$$F = F(l + 1 - n, 2l + 2, \rho). \tag{6}$$

When n is an integer the series expansion for F breaks off so as to give derivatives of Laguerre polynomials. The wave function then has a node at $r_0 = \infty$, being the normal boundary condition of the free hydrogen atom.

The purpose of this article is to calculate how the $1s$, $2s$ and $2p$ levels of the hydrogen atom are changed when it is uniformly compressed, i.e. when a node lies at finite r_0. The energy levels are shifted to higher values through the influence of the potential wall. Corresponding values of energy E and radius r_0 of the cage will be calculated for the whole range beginning with the large values of r_0. The notation †) "$1s$, $2s$ and $2p$ level" will be maintained, although the number n is only an integer for $r_0 = \infty$. The quantum number l is of course not changed by compression.

§ 2. *The method of M i c h e l s, D e B o e r and B i j l.* For a radius r_0 so large, that the deviation of E from its value at $r_0 = \infty$ is still very small, M i c h e l s, D e B o e r and B ij l [1]) have developed an approximative method. They calculated the shift

*) $$F(\alpha, \gamma, \rho) = 1 + \frac{\alpha}{\gamma}\rho + \frac{\alpha(\alpha+1)}{\gamma(\gamma+1)}\frac{\rho^2}{2!} + \ldots. \tag{7}$$

The confluent hypergeometric functions have specially been investigated by W h i t t a k e r [3]). The connection of his symbols k, m and z with the variables l, n, and ρ used here is: $k = n$, $m = l + \frac{1}{2}$ and $z = \rho$. B u c h h o l z' [4]) parameters $\nu \equiv i\tau$, p and $z \equiv i\zeta$ are $\nu = n$, $p = 2l + 1$ and $z = \rho$.

†) Indicating the first symbol of this notation by N and the second by l, the number N can be defined by saying that the wave function "Nl" has $N - l - 1$ nodes between its limiting points. This "principal quantum number" N coincides with the variable n (corresponding with E by formula (2)) for $r_0 = \infty$ only.